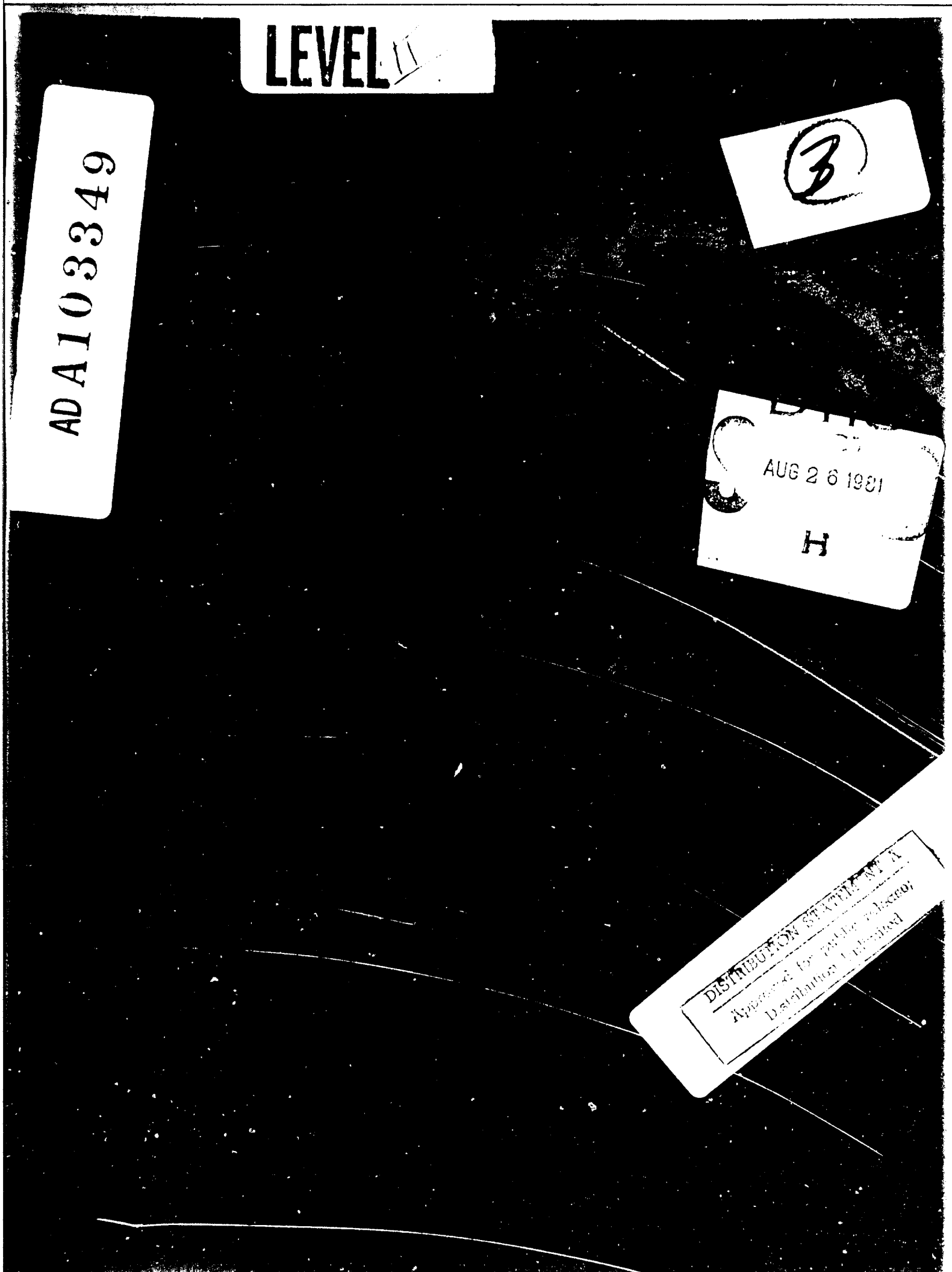
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FOREWORD

This is the first edition of a semiannual publication of high quality Army studies. The purposes of the report are to:

Inform a wide audience about high quality Army studies

Encourage excellence in Army Analysis activities

Give visibility to deserving individual analysts.

Inclosed are summaries of five studies performed by the Army. The studies were selected by this office from nominations submitted by the US Army commands and agencies.

The Army has long understood the importance of high quality analytic support to decisionmaking. Wide dissemination of quality efforts assures that attention is given to work of this caliber and provides a challenge to the study community to maintain such high standards in the future.

JOANN H. LANGSTON
Director, Study Program
Management Office
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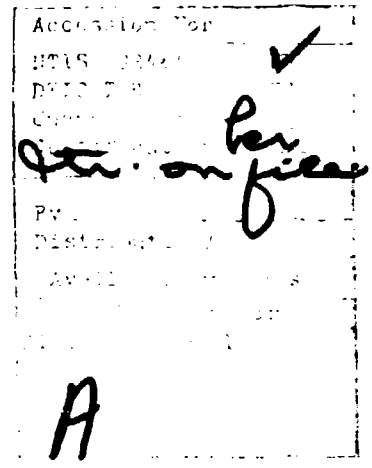

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STUDY A

1. STUDY TITLE: Infantry Close Combat Advanced Antiarmor Requirements Study (ICCAARS).

2. SPONSORING ORGANIZATION AND POC: HQ TRADOC, CPT Sam Koster.

3. PERFORMING ORGANIZATION AND POC: United States Army Infantry School, CPT Monty Anderson.

4. PROBLEM: The Infantry currently has three antiarmor weapons systems: the LAW, the DRAGON, and the TOW. New threat and new antiarmor technologies have, however, forced the US to consider the development of new antiarmor systems. What is not known is which systems should be developed. The medium range system is of particular importance because the US has agreed to take the lead among NATO nations in developing a medium system and because there is no improved version of the DRAGON approved for further development. A new look at the US antiarmor program is required given current cost constraints and increasing difficulty to penetrate armor.

5. APPROACH: The purpose of this study was to determine the Infantry close combat antiarmor weapon systems requirements, with particular emphasis on the medium range system. These requirements can be used to establish a developmental program for advanced systems. The US Infantry School (USAIS) performed this study with analytical data support provided by US Army TRADOC Systems Analysis Activity (TRASANA), US Army Missile Command (MICOM), Ballistics Research Laboratory (BRL), US Army Materiel Systems Analysis Activity (AMSAA), Armament Research and Development

Command (ARRADCOM), Electronics Research and Development Command (ERADCOM), and the US Army Human Engineering Laboratory (HEL). The study includes analyses of mission needs, deficiencies, and opportunities; threat and operational environment; constraints; operational concepts; functional objectives; system alternatives; system characteristics; system performance, and system effectiveness; cost; uncertainties, and preferred alternatives. Key issues were: (1) Establishment of the need for an Infantry Manportable Antitank Assault Weapon System (IMAAWS): (2) Manportability requirements for IMAAWS: (3) Survivability of the IMAAWS gunner on the battlefield; (4) Determination of the desired performance characteristics in terms of lethality (PSSK) and range for IMAAWS, and (5) Determination of the preferred System Organization, Tactics, and Techniques (SOTT). The findings of each analysis are combined with military judgment. Conclusions and recommendations are made.

6. FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS: Although the study results are classified, they demonstrate antiarmor requirements for 1986 and 1990 time frames based upon force effectiveness and military judgment. Desirable systems characteristics: weight, range, PSSK, survivability, effects from countermeasure, and force costs are well documented in the study. Force effectiveness was derived from a combination of two scenarios - Mid-East and European. They include combat ratios, key equipment survivability, unit effectiveness, and force employment.

7. DTIC Number has not yet been assigned. Final report is classified.

STUDY B

1. STUDY TITLE: Force Electronic Warfare/Tactical SIGINT (FEWTS)

2. SPONSORING ORGANIZATION AND POC: HQ TRADOC, COL Gardner.

3. PERFORMING ORGANIZATION AND PRINCIPAL TEAM PERSONNEL:

US Army Concepts Analysis Agency

MAJ Gregory A. Boyer, Study Director

MAJ Eric C. Helsers	Mr. Robert D. Orlov
Dr. Aqeel Khan	MAJ Stephen L. Shupack
Mr. Myron Lawrence	LTC Joseph W. Stilwell
Ms. Rose Brown	Ms. JoAnn W. Vines

4, PROBLEM: The simultaneous introduction of a wide variety of new EW/SIGINT and weapon systems for the post-1980 time frame bears close scrutiny because of the constrained fiscal environment. An analytic basis is therefore required to provide justification for procurement and force structuring decisions with respect to EW/SIGINT systems. This analysis must provide sufficient details to assess the potential of selected ECM/ESM/tactical SIGINT systems to enhance/augment existing or proposed weapons systems in a force.

5. APPROACH: The structure of the methodology can be divided into three phases as follows:

a. Phase I consisted of a sequential set of analyses. First, a hearability and degradation analysis

performed by DOD ECAC using a terrain dependent propagation loss model which considered force deployment, emitters, receivers, and net structures, provided estimates of the requisite jamming and COMINT collection systems' input. Second, an operational factors analysis was performed at CAA to incorporate the effects of threat communications activity, the number of jamming/intercept systems available, the respective function times and system operational rates, and the targeting strategies on the input data.

b. Phase II was the exercise of the combat and network models and resource analysis. The simulation models operate on the original environment/data and the operational jammer and COMINT collection system probabilities.

c. Phase III was the analysis and merging of the results.

6. RESULTS: While specific details of the study results are classified and should be obtained in context from the study report, the major areas of findings are highlighted below:

a. Contribution of Tactical EW. This study reaffirmed and quantified, for the first time, that the combat value of jamming is highly dependent upon a combination of the tactical situation and EW tactics being employed. In some instances, jamming could not contribute positively to combat outcomes. The major importance of effective and timely battle management of EW assets was highlighted in

the study results. A critical need for improved processing and automation in intelligence fusion and CEWI operations was highlighted as a requirement for the Army's Counter-C^3 efforts.

b. Contribution of Tactical COMINT. The potential value of tactical COMINT and DF systems in providing a commander timely intelligence on the movement or disposition of enemy forces was confirmed in this study. The value to EW battle management was also affirmed. The need for increased automation in the intelligence collection and fusion process when opposing a major enemy with modern electromagnetic systems was identified.

7. CONCLUSIONS: An assessment of the value of jamming on the basis of one-on-one technical performance can be misleading. Other factors such as the enemy threat environment, local terrain over which an EW force is deployed and EW concepts and battle management can significantly constrain the combat effectiveness of jamming operations in a force-on-force situation. On balance, the value of other elements of EW can be clearly supported. Also, the potential value of automation (well conceived and implemented) can be shown.

8. IMPLEMENTATION: Results of the study were forwarded to TRADOC, the sponsor, and subsequently distributed to interested agencies. A follow-on study is underway to examine the ramifications resulting from the addition of the PIRANHA jammer and a higher power QUICKFIX system.

9. DTIC ACCESSION NUMBERS:

Volume I, C025164
Volume II, C025165
Volume III, C025166

STUDY C

1. STUDY TITLE: Safe Transport of Munitions (STROM)

2. SPONSORING ORGANIZATION AND POC: Military Traffic Management Command (MTMC); A. J. Dowd, Special Assistant for Transportation Engineering.

3. PERFORMING ORGANIZATION AND PRINCIPAL AUTHORS: MTMC Transportation Engineering Agency (MTMCTEA); Robert Dienes, Projeect Engineer; Anthcny M. Ragunas, Program Coordinator; Dr. Joe W. Knickmeyer, Cost/Risk Analyst.

4. PROBLEM: How to prevent or limit the effects of explosive incidents in railcars and mass detonation of containerized munitions in port areas and aboard ships.

5. APPROACH:

In a memorandum for the Deputy Assistant Secretary of Defense (SM&S), the Chairman of the Department of Defense Explosives Safety Board recommended that a study of the problem be made with a project manager assigned by MTMC.

A study plan developed by MTMCTEA and approved by OASD(I&L) designated MTMC as program coordinator with authority to select study participants, provide guidance, determine priorities, and manage program funds. Thirteen study tasks were assigned according to the availability of special expertise and physical assets to the three participating DOD commands: DARCOM, NAVSEASYSCOM, and MTMC. Areas of study included railroad traffic patterns, fire protection systems all steel railcars, spacer cars, and

containerized munition. Methodology employed by the participants included researching available literature, analyzing data, developing conceptual proposals, establishing testing requirements, and providing cost/risk estimates.

Reports were submitted for each task from which a final consolidated report was written by MTMC.

6. RESULTS: The study identified a number of methods by which explosive incidents can be eliminated or reduced during the transportation of ammunition and explosives. Cost and risk analyses were performed on each of nine recommendations and then ranked in order of overall merit.

7. CONCLUSIONS:

a. DOT and DOD regulations governing munitions shipments are generally adequate with good overall compliance by shippers and carriers.

b. Fire is the principal threat to munitions transported by rail and the most likely cause of an explosion.

c. DOD's distribution and routing policies for rail transport of munitions do not consider intransit public exposure.

d. All-steel railcars offer no distinct advantage for fire protection over currently authorized cars.

e. Railcar stability can be improved through the

use of a number of trains makeup techniques.

f. Railcar fire detection/suppression systems have been proven technically feasible.

g. Thermal protection techniques can delay munition cook-off reaction and lessen its severity.

h. It is technically feasible to limit the size of an explosion of mass detonable numitions by spacing, reconfiguration, and/or shielding.

i. Spacer cars are not feasible for use in preventing car-to-car explosives propagation.

j. Pallet shielding is an effective but costly buffer for containerized munitions.

8. RECOMMENDATIONS:

a. The prevention of cook-off and mass detonation should be a mandatory design consideration in requirements documents for all munitions.

b. The DOT should evaluate the feasibility of establishing minimum separation distances between standing explosives laden railcars and other placarded cars.

c. Cushioned underframe railcars should be authorized for transporting Class A explosives.

d. Carriers should be required to inspect railcars

for hazardous residues prior to the loading of Class A explosives.

e. Trains with cars carrying Class A explosives should be made up utilizing techniques based on car length and weight.

f. Further testing of fire detection/suppression systems for munitions railcars should be conducted under operating conditions.

g. 155mm separate loading projectiles (SLP) should be reconfigured to 13 units of 8 pallets each per 50 foot railcar.

h. Tests should be conducted to determine whether reconfigured railcar loading methods developed for the 155mm SLP can be applied to other SLPs.

i. Tests should be conducted to determine whether the use of nose plugs, reorientation, and spacing can limit the explosion size to a single multipallet unit of MK80-series bombs.

9. IMPLEMENTATION: Recommendations are to be implemented by components of both DOD and DOT. The study report was submitted to OASD (MRA&L) in June 1981 for review and comment.

10. DTIC ACCESSION NUMBER: DA725002.

STUDY D

1. STUDY TITLE: Non-NATO Contributions to Coalition Warfare.

2. SPONSORING ORGANIZATION AND POC: HQDA, ODCSOPS(DAMO-SSA), Mr. Henry Bodson.

3. PERFORMING ORGANIZATION AND PRINCIPAL AUTHORS: Strategic Studies Institute, US Army War College. LTC Edward A. Corcoran, Study Manager; Colonel Charles W. Stover; Dr. Gabriel Marcella; LTC Benedict F. FitzGerald; LTC David L. Pearce; LTC Todd R. Starbuck; Mr. Robert J. Stevens.

4. PROBLEM: Budget and resource constraints are forcing the United States to rely increasingly on a coalition approach to attain national security objectives. Intensified cooperative efforts with allied and friendly nations provide a realistic way in which the United States can achieve credible deterrence and defense at acceptable costs. Although any major conflict between the United States and the Soviet Union would be expected to involve all of NATO and the Warsaw Pact, the conflict would undoubtedly also involve regions besides Europe. In such a conflict the United States and NATO would require support from other allied and friendly states worldwide.

5. STUDY PURPOSE: To identify the potential contributions of Non-NATO allied and friendly nations in a major war between the Soviet Union and the United States, the circumstances (e.g., diverging national interests) which might affect the dependability of these contributions, and the expected US commitments needed to effect these contributions. The term contributions emphasized military

contributions (combat, combat support forces); but where pertinent, includes other significant military related capabilities such as industrial capacity, bases facilities, surveillance sites, and raw materials.

6. APPROACH: The study first assesses the US historic experience with coalition warfare and identifies primary motivations and objectives of coalition partners, and US objectives assisted by the support of the coalition partners. It then examines the current strategic setting, US wartime objectives and their projected evolution. Against this background, individual countries are assessed in terms of their strategic significance, the importance of US interests in the country, and the support which the United States expects to realize on the basis of existing treaties and agreements. Attention focuses on those countries which have the greatest potential for making significant contributions to US strategic efforts.

7. RESULTS: The study provides a comprehensive assessment of the support which the United States could receive from Non-NATO friendly and allied countries during a major war.

8. CONCLUSIONS: In a crisis situation, friendly nations can be expected to consult with the United States and to take actions which they consider appropriate. Formal defense treaties by themselves cannot insure desired support from these nations in the event of major war with the Soviet Union. They can provide a basis for coalition cooperation and promote common approaches to military doctrine and operations.

9. RECOMMENDATIONS: The United States should encourage and support efforts of allied and friendly nations to develop and maintain resolute national defense establishments and force capabilities which complement US and NATO efforts. Improvements in antiarmor weaponry and air defense, antisubmarine warfare and coastal patrol systems are particularly necessary to deter aggression and strengthen regional stability. The United States should cooperate in developing local arms production facilities along the lines of mutual benefit as well as a comprehensive assessment of US and allied wartime energy needs. The US Army can specifically support these efforts by continued development of its area specialist programs and efforts to provide general cultural orientation for troops being stationed overseas.

10. IMPLEMENTATION: The US Army Deputy Chief of Staff for Operations and Plans has recommended the study for use by Government agencies.

11. DTIC ACCESSION NUMBER OF FINAL REPORT: C024791L

STUDY E

1. STUDY TITLE: Logistic System Survivavility in a Chemical Warfare Environment.

2. SPONSORING ORGANIZATION AND POC: HQDA, ODCSOPS(DAMO-NC) and ODCSLOG(DALO-PL); LTC M. E. Burge, US Army Nuclear and Chemical Agency.

3. PERFORMING ORGANIZATION AND PRINCIPAL AUTHORS: Science Applications, Inc., McLean, VA; R. E. Robinson, M. March, R. Nugent, C. Porter.

4. PROBLEM:

a. Determine the vulnerability of the logistic support system in Europe to chemical attack.

b. Devise affordable means for insuring its survivability and sustained operational effectiveness in a chemical warfare environment.

5. APPROACH:

a. Logistics, for study purposes, included the reception, storage, handling, and distribution of all classes of supplies; direct support and higher levels of maintenance; recovery and salvage; operation of air and surface lines of communications; second echelon and higher medical support; and automated logistics management.

b. The study steps and logic were as follows:

(1) Measure logistic system component reaction

to a chemical environment. For this purpose, 25 company size units, representing all logistic functions, were selected for detailed analysis.

(2) Develop fixes to improve component reaction.

(3) Measure overall logistic system reaction to a chemical attack in terms of degraded ability to meet combat demands. The system was analyzed in both its M+10 (mobilization + 10 days) and M+70 configurations.

(4) Identify overall system fixes and those high leverage components whose assisted recovery would most benefit system performance.

c. Physical damage levels were obtained by chemical effects modeling using the NUSSE and PARACOMPT models. These levels were then translated into organizational functional damage and reconstitution capability as a function of time using the AMORE methodology. The IOLOG model and other analytic techniques were employed to evaluate these data to determine the total system's vulnerabilities and its dynamic response to attack.

6. RESULTS: As the pioneer analysis of chemical attack on the logistic system, the study is contributing to the development of logistics concepts and doctrine and to the analytical base for further logistic system studies. There are also implications for force structure and training methodologies. However, these must be evaluated in a total threat context to avoid suboptimization.

7. CONCLUSIONS:

a. In most logistic units, replacing personnel skills rather than total numbers of casualties is the most limiting factor in recovery level.

b. The most limiting factor for productivity at a given recovery level is work rate constraints imposed by the chemical protective ensemble.

c. Of the 25 units analyzed, seven were identified as having the most impact on postattack system support levels.

d. Logistic units' decontamination capability is severely inadequate, in terms both of TOE equipment and mission stocks. An improved capability is required; however, contamination avoidance must be a primary goal.

e. Tradeoffs in protection equivalent to Mission Oriented Protective Posture (MOPP) I versus MOPP IV are extremely sensitive to unit types.

8. RECOMMENDATIONS:

a. Improve cross training of personnel.

b. Doctrine should prescribe complete decontamination, when possible, to allow early reduction in MOPP. A contamination monitor is also required.

c. Planners should target high leverage units for

improved chemical defense capability and recovery assistance.

d. Improve both decontamination and contamination avoidance capabilities.

e. Unit commanders should be aware of risk trade-offs. Units highly sensitive to casualties should have priority for attack warning.

9. IMPLEMENTATION: HQDA and TRADOC will incorporate approved recommendations in the Army Chemical Action Plan.

10. DTIC ACCESSION NUMBERS:

Volume I, Executive Summary, AD-C024114-L
Volume II, Main Report, AD-C024115-L
Volume III, Appendices A-C, AD-C024116-L
Volume IV, Appendix D, AD-B054823-L
Volume IV, Appendix D (con't), AD-B054824-L
Volume V, Appendices E-F, AD-C024119-L

APPENDIX I

ABBREVIATIONS

CAA	:	US Army Concepts Analysis Agency
C^3	:	Command, Control, and Communications
CEWI	:	Combat Electronic Warfare and Intelligence
COMINT	:	Communications Intelligence
DARCOM	:	US Army Materiel Development and Readiness Command
DOD	:	Department of Defense
DOT	:	Department of Transportation
DTIC	:	Defense Technical Information Center
ECM	:	Electronic Countermeasures
ESM	:	Electronic Warfare Support Measures
EW	:	Electronic Warfare
HQDA	:	Headquarters, Department of the Army
LAW	:	Light Antitank Weapon
NATO	:	North Atlantic Treaty Organization
NAVSEASYSCOM	:	Naval Sea Systems Command
OASD(MRA&L)	:	Office Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics)
ODCSLOG	:	Office, Deputy Chief of Staff for Logistics
ODCSOPS	:	Office, Deputy Chief of Staff for Operations and Plans
PSSK	:	Single Shot Kill Probability
TOE	:	Table of Organization and Equipment
TOW	:	Tube Launched, Optically Tracked, Wire Guided Missile
TRADOC	:	US Army Training and Doctrine Command